

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re patent application of: Bernard RUCHET #3

Assignee: EXFO Electro-Optical Engineering Inc.

Serial No. International Patent Application PCT/CA 04/001552
(Request for national entry submitted herewith)

International filing date: August 23, 2004

Title: Method and Apparatus for Testing Optical Networks

Examiner: Not known Art Unit: Not known

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PETITION TO MAKE SPECIAL UNDER 37 CFR 1.102(d)

Sir:

A Request for entry of the above-identified international patent application number PCT/CA 04/001552 into the national phase is submitted herewith.

The applicant hereby petitions for the resulting national patent application to be **made special** and subjected to accelerated examination on the grounds that:

- A. There is an infringing device actually on the market.
- B. A rigid comparison has been made between the alleged infringing device and the claims of the above-identified application and, in the opinion of the undersigned, some of the claims are unquestionably infringed.

A comparison of the alleged infringing article with claims 1 to 4 of the application, as amended, is set out below, followed by the required Statement pursuant to M.P.E.P. 708.02.

Please deduct the required Petition fee of \$130.00 under 37 C.F.R. 1.17(h) from deposit account number 20-0771. Although this amount is believed to be correct, if it is not, please deduct the correct amount and notify the undersigned accordingly.

COMPARISON OF THE ALLEGED INFRINGING DEVICE WITH THE CLAIMS OF THE ABOVE-IDENTIFIED APPLICATION

Submitted herewith the following documents:

Appendix I is a copy of a manual for a Triplex Power Meter by LiComm Co., Ltd.

Appendix II is a view of the exterior of such a Triplex Power Meter model TPM-5SH.

Appendix III is a first view of the interior of the Triplex Power Meter model TPM-5SH with certain components labelled.

Appendix IV is a second view of the interior of the Triplex Power Meter model TPM-5SH with certain components labelled.

Appendix V is a schematic diagram of the configuration of the relevant components of the Triplex Power Meter model TPM-5SH labelled with the reference numbers used for corresponding components shown in Figures 1, 2 and 3 of the present application.

Claim 1 to 8 of the present application, as amended by the Preliminary Amendment submitted herewith, are reproduced below, clause by clause, with intercalated comments identifying corresponding components of the Triplex Power Meter.

1. *Portable apparatus for measuring parameters of optical signals propagating concurrently in opposite directions in an optical transmission path (16, 16/1,..., 16/9) between two elements (10, 14/1...14/9), at least one (14/1...14/9) of the elements being operative to transmit a first optical signal (S1) only if it continues to receive a second optical signal (S2) from the other (10) of said elements, the instrument comprising first and second connector means (22, 24) for connecting the instrument into the optical transmission path in series therewith,*

Pages 7 and 10 of the manual (Appendix I) indicate that the connectors OLT (SC/APC) and ONT (SC/APC) of the Triplex Power Meter are connected between an OLT and an ONT of a passive optical network and the meter “simultaneously measures powers of triple wavelengths (1310nm, 1490nm and 1550nm) using the function of signal pass-through between OLT (1490nm, 1550nm) port and ONT (310nm) (*sic*) port in PON system.” As explained in the present applicant’s specification (page 1, line 31 to page 2, line 2), in such PON systems there is no 1310-nm transmission from the ONT when the fiber link is disconnected, thereby preventing reception of the 1490-nm downstream-data signal from the OLT.

“Pass-through” allows propagation of all three signals through the instrument while they are being measured simultaneously.

and means (32, 38, 46) connected between the first and second connector means for propagating at least said second optical signal (S2) towards said at least one (14) of the elements,

In the Triplex Power Meter, the coupler unit (32) is connected between the connectors and allows at least the second signal S2 (1490nm) to pass towards the ONT.

and measuring said parameters of said concurrently propagating optical signals (S1, S2).

In the Triplex Power Meter, detectors D1310 (38), D1490 (42) and D1550 (44) connected to processing circuitry allow such parameters to be measured for all three signals (1310nm, 1490nm, 1550nm) simultaneously (see manual page 10).

Accordingly, claim 1 is infringed.

Claim 2 reads as follows:

2. *Apparatus according to claim 1, wherein the propagating and measuring means (32, 38, 46) provides an optical signal path between the first and second connector means (22, 24) for conveying at least a portion of said second optical signal (S2).*

Claim 2 is infringed because the Triplex Power Meter provides an optical path (couplers and fibers) between the first and second connector means.

Claim 3 reads as follows:

3. *Apparatus according to claim 2, wherein the propagating and measuring means (32, 38, 46) comprises:*

coupler means (32) having first and second ports (28, 30) connected to the first and second connector means (22, 24), respectively, to provide said optical signal path to convey said first (S1) and second (S2) optical signals in opposite directions between said first and second connector means (22, 24), and a third port (34) for supplying a portion (S1') of said first optical signal (S1),

detection means (38; 38, 42; 38, 42, 44) for converting at least the first optical signal portion (S1') into a corresponding electrical signal, and

measuring means (46) for processing the electrical signal to provide an indication of said measured parameters.

Claim 3 is infringed because the Triplex Power Meter has two couplers in tandem (*coupler means*) having two ports connected to the connectors (22,24) and a third port connected to detector D1310 (38).

Claim 4 reads as follows:

4. *Apparatus according to claim 3, wherein the coupler means (32) has a fourth port (36) for supplying a portion (S2') of said second optical signal (S2), the detection means (38; 38, 42; 38, 42, 44) also converting at least part of the second optical signal portion (S2'') into a corresponding second electrical signal, and the measuring means (46) processing both of the electrical signals to provide desired measurement values of parameters for each of the counter-propagating signals.*

Claim 4 is infringed because the coupler means in the Triplex Power Meter also has a fourth port for supplying the second (1490nm) optical signal to detector D1490 (42).

Claim 5 reads as follows:

5. *Apparatus according to claim 1, wherein, where said one of the elements (14/1,..., 14/9) also receives via said optical transmission path a third optical signal (S3) at a different wavelength from that of said second optical signal (S2), the propagating and measuring means (46) further comprises means (40, 44, 52, 58; 44, 58,68) for measuring parameters of the third optical signal (S3).*

Claim 5 is infringed because the Triplex Power Meter has a detector D1550 (44) which detects the 1550nm signal (S3).

Claim 7 reads as follows:

7. *Apparatus according to claim 4, wherein, where said one of the elements (14/1,..., 14/9) also normally receives via the optical transmission path a third optical signal (S3) at a wavelength different from that of said second optical signal (S2), said propagating and measuring means comprises a wavelength discriminator (68) connected to the coupler (32) for separating at least a portion (S2', S3') of the combined second and third optical signals (S2, S3) according to wavelength to obtain corresponding separate portions (S2'', S3'') and supplying same to said detection means (38, 42, 44).*

Claim 7 is infringed because the Triplex Power Meter has a wavelength discriminator WDM (68) which separates the 1490nm and 1550nm signals according to wavelength.

Claim 8 reads as follows:

8. *Apparatus according to claim 1, wherein the measuring means comprises a separate detector (38, 42, 44) for each of the measured optical signal portions.*

Claim 8 is infringed because the Triplex Power Meter has separate detectors D1310 and D1490.

It is submitted that the corresponding method claims would be infringed by use of the Triplex Power Meter. For the sake of brevity, such infringement has not been documented herein but would be provided if required.

STATEMENT PURSUANT TO M.P.E.P. 708.02

The undersigned has caused a careful and thorough search of the prior art to be made. In particular, an International Search has been conducted, and an International Search Report issued, by an International Searching Authority in respect of the above-identified international patent application.

Submitted herewith, as Appendix VI, are (i) a copy of the International Search Report; and (ii) a copy of each of the references cited in it.

The International Search Report cited four documents, namely:

European patent application No. 0786878 - cited as *background only*;

US patents Nos. 6,476,919 and US 6,396,575 and International patent application No. WO01/33746A2 - cited as category "Y" documents in respect of claims 1-5, 9-11, 12-16 and 20-23.

There are fundamental differences between the claimed features of the present invention and the features of the devices disclosed in US patents Nos. 6,476,919 and US 6,396,575 and International patent application No. WO01/33746A2, as detailed in the following paragraphs.

The claims of the present application are directed to a portable instrument for measuring parameters of optical signals propagating concurrently in opposite directions in an optical transmission path (16, 16/1,..., 16/9) between two elements (10, 14/1...14/9). At least one (14/1...14/9) of the elements is operative to transmit a first optical signal (S1) only if it continues to receive a second optical signal (S2) from the other (10) of the two elements.

The portable instrument has:

first and second connector means (22, 24) for connecting the instrument, in series, in an optical transmission path (16, 16/1,..., 16/9) between two the elements (10, 14/1...14/9) and

means (32, 38, 46) connected between the first and second connector means for

propagating at least said second optical signal (S2) towards said at least one (14) of the elements, and

measuring said parameters of the concurrently propagating optical signals (S1, S2).

Such a portable instrument may be used to measure optical signals propagating in a link of a passive optical network, especially a so-called Fiber-To-The-Home (FTTH) optical network.

US6,476,919 discloses a polarization independent reflectometer. Apart from the fact that the present invention is not directed to reflectometers, the reflectometer disclosed in US6,476,919 is not used with optical signals *per se* which propagate in both directions. Rather, a single optical signal propagates in one direction, and portions of this optical signal which have reflected from perturbations/Rayleigh reflection propagate in the opposite direction. In addition, the reflectometer disclosed in US6,476,919 has its own light source (a low coherence source), which supplies white light to the device-under-test (DUT), whereas the device claimed in the present application monitors optical signals already propagating in a link of an optical network, to and from an end customer, and which have discrete wavelengths and are modulated with information content. Following from this distinction, the signals received by the two detectors of the reflectometer disclosed in US6,476,919 have the same spectral content (i.e. wavelength). The signals received by the two detectors of the instrument claimed in the present application, however, have different spectral content because the two optical signals propagating in the two directions have two different wavelengths, respectively.

US6,396,575 discloses an optical cross-connect switch. The only similarities between this switch and the instrument claimed in the present application lie in the components used, such as optical couplers, detectors, and opto-electronic converters, and the fact that certain optical paths allow signals to pass through them bidirectionally. The claims of the present application neither read onto, nor are suggested by, the disclosure of US6,396,575.

WO01/33746A2 discloses an apparatus and method for performing reflectometric measurements downstream in a passive optical network (PON). The apparatus has its own optical source and requires that so-called "polarization markers" be deployed and embedded directly into the PON. The instrument claimed in the present application does not have its own source as it characterizes the optical signals already propagating in a PON while the network is in operation. Indeed, the main object of the invention is to ensure that at least one of the signals continues to be received by the corresponding element so as to avoid the network ceasing to operate. In addition, the device according to the present invention does not require any permanent modification of the network itself.

In view of the foregoing, it is submitted that all claims of record are patentable over the cited documents since the combinations of features recited in the claims of record are neither disclosed nor suggested by the cited documents whether taken individually or in combination.

It is further submitted that at least some of these claims read onto the Triplex Power Meter TPM-5SH by Licomm Co., Ltd.

Accordingly, applicant's interests would be prejudiced if the application were not "made special" and its examination expedited.

Respectfully submitted,



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APPENDIX I

**Triplex Power Meter
(TPM)
User's Manual**

LiComm Co., Ltd.

Read this manual before using the equipment.

1. Introduction

The LiComm TPM(Triplex Power Meter) series is handheld, compact, light weight and multi functional optical power meter. The TPM series can be used specialized optical power meter for PON (Passive Optical Networks) system in FTTH, FTTP and FTTC.

The TPM series simultaneously measures powers of triple wavelengths (1310nm, 1490nm and 1550nm) using the function of signal pass-through between OLT(Optical Line Terminal:1490nm,1550nm) and ONT(Optical Network Terminal:310nm) in PON system. The downstream 1490nm and upstream 1310nm wavelengths are used to transmit data and voice. Video services are converted to optical format at 1550nm by the optical video transmitter. The 1550nm and 1490nm wavelengths are combined by the WDM coupler and transmitted downstream together.

Additionally, the TPM series can be used general handheld optical power meter(single function).

It offers various function with the internal memory for data saving and serial interface.



2. Safety Information

Warning

1. The equipment cannot be repaired by the user. DO NOT attempt to open the cabinet or to disassemble internal parts.
2. The instrument uses a Liquid Crystal Display (LCD); DO NOT subject the instrument to excessive force or drops it. If the LCD is subjected to strong mechanical shock, it may break.
3. Over-input to the optical detector will damage the photodiode.
DO NOT input light exceeding the measurable range (+20dBm)

Caution

CAUTION: Avoid the static electricity



3. Characteristics and Features

3.1 Specification

3.1.1 Triplex power meter operation

Parameter	Typical value	Unit
Power measurement range	1310nm	-40 ~ +20 dBm
	1490nm	-40 ~ +20 dBm
	1550nm	-40 ~ +20 dBm
Pass through insertion loss	2.5	dB
Spectral passband wavelength	1310nm	1260~1360 nm
	1490nm	1483~1497 nm
	1550nm	1545~1565 nm
Calibrated wavelength	1310, 1490, 1550	nm
Accuracy	<0.5	dB
Resolution	<0.01	dB
Optical Connector Type	SC/APC or FC/APC	
Photodiode Type	InGaAs	
Unit Display	dBm, dB, mW, nW, pW	
Data Save Number	500 sets	
Serial Interface	USB 2.0	
Display	Graphic LCD	
Power supply	Dry batteries : 3*AAA 1.5V Or NiMH cells : 3*AAA 1.2V	
Operating time	Dry batteries : 50 hours NiMH cells : 45 hours	
Auto Power Off	5 minutes auto off [ON/OFF]	
Size	125*80*36.7 mm	
Weight	200g	

Table 1. Triplex power meter operation

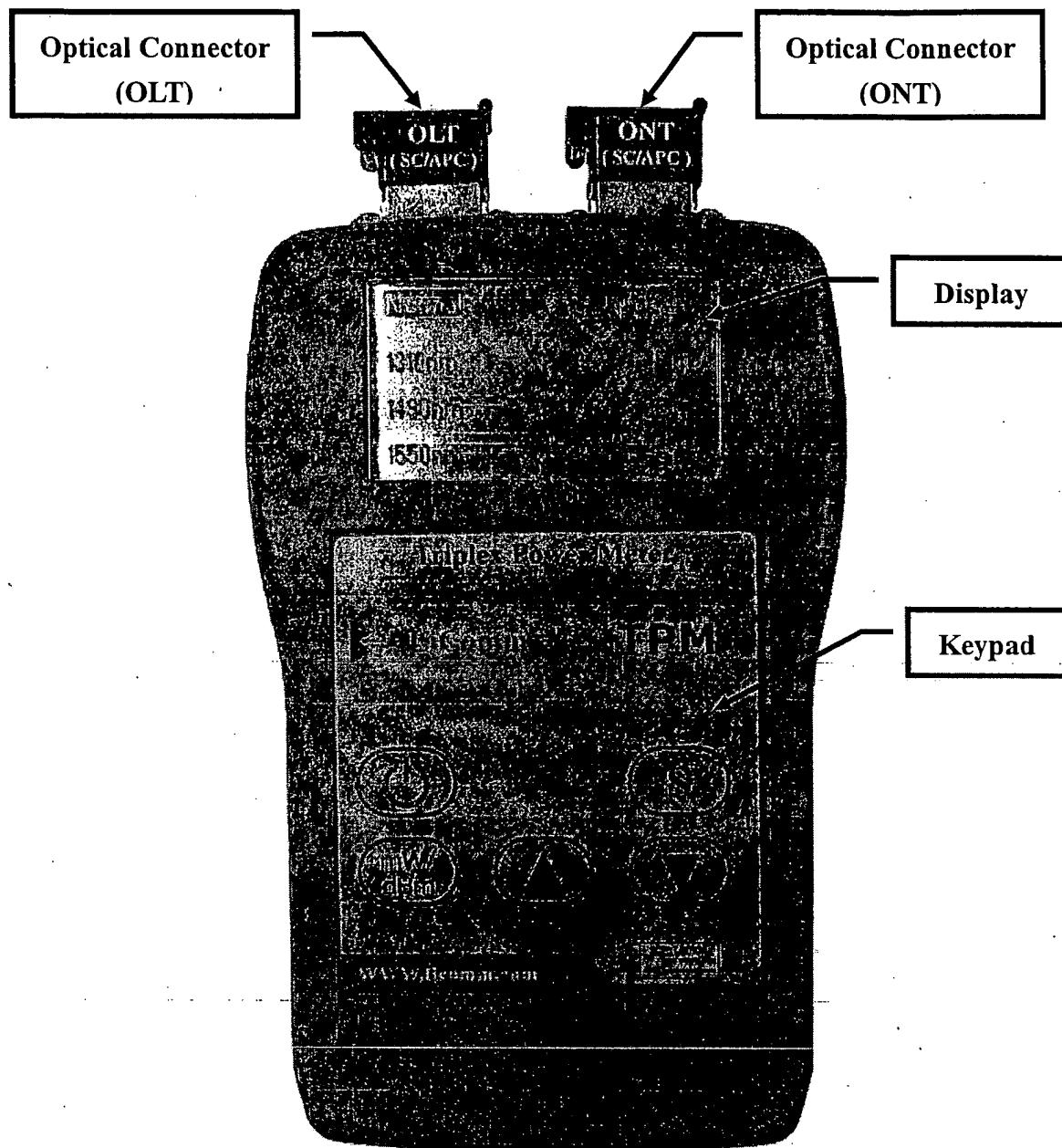


3.1.2 Single power meter operation

Parameter	Typical value	Unit
Wavelength Range	1250 ~ 1700	nm
Standard Wavelength Settings	1310, 1490, 1550, 1620	nm
Display Range	-40 ~ +20	dBm
Max. permitted input level	+20	dBm
Accuracy	< 0.2	dB
Resolution	< 0.01	dB

Table 2. Single power meter operation

3.2 Front Panel



3.3 Key Description

Triplex function – Normal mode

Key	Main Function	*Alternate Function
	<ul style="list-style-type: none"> ● Power ON ● LCD Backlight ON/OFF 	Power OFF
	<ul style="list-style-type: none"> ● Select Measurement Units [mW/ dBm] 	Go Single Function
		Power Saving Mode
	<ul style="list-style-type: none"> ● Go Into the Data Save Mode 	Return Normal Mode

*Hold the button pressed over 3 seconds to activate an alternate function

Single function – Normal mode

Key	Main Function	*Alternate Function
	<ul style="list-style-type: none"> ● Power ON ● LCD Backlight ON/OFF 	Power OFF
	<ul style="list-style-type: none"> ● Select Measurement Unit [mW/ dBm] 	Go Triplex Function
	<ul style="list-style-type: none"> ● Optical Power variation measurement mode [ΔP] 	Power Saving-Mode
	<ul style="list-style-type: none"> ● Select Wavelength [λ] 	Return Single Mode

*Hold the button pressed over 3 seconds to activate an alternate function



Power Saving

Key	Main Function
	<ul style="list-style-type: none">● Return Normal Mode
	<ul style="list-style-type: none">● Power Save ON/OFF

Data Saving

Key	Main Function	*Alternate Function
	<ul style="list-style-type: none">● Cursor moves 1 line to left	Change section of cursor moves
	<ul style="list-style-type: none">● Increase the value of the selected digit	
	<ul style="list-style-type: none">● Decrease the value of the selected digit	
	<ul style="list-style-type: none">● Go Into the Data Saving Mode● Store Data	Return Triplex Mode

*Hold the button pressed over 3 seconds to activate an alternate function

4. Operating TPM

4.1 General Function.

TPM provides optical power meter function of 'Triplex function' and 'Single function'.

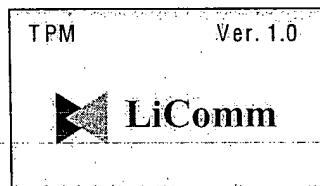
The 'Triplex function' simultaneously measures powers of triple wavelengths (1310nm, 1490nm and 1550nm) using the function of signal pass-through between OLT(1490nm,1550nm) port and ONT(310nm) port in PON system. The 'Single function' acts like general optical power meter using ONT port. 'Triplex function' of TPM is default setting.

4.1.1 Power ON/OFF

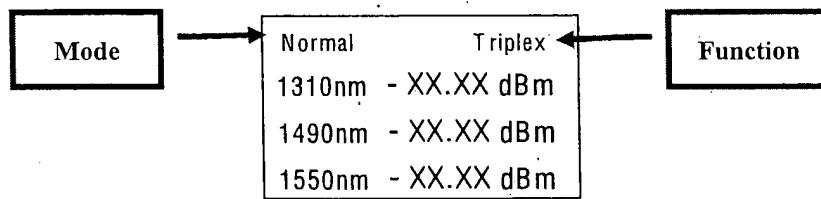
Power ON

To turn on the TPM, press the  key.

When you turn on the TPM, the function of TPM is remained previous selection.
The initial display of the LCD display is as follows.



When the TPM initializing process finished, the display of the LCD is as follows.

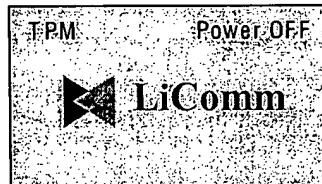


Always clean the optical connectors before connecting to the instrument.

Power OFF

To turn off the TPM, press the  key for over 3 seconds.

When the following screen appears at a Display window, release the  key.



4.1.2 Selecting Optical Power Units

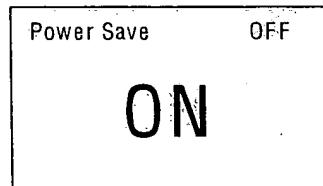
Press the  key to switch the power units to dBm or mW in the normal mode.

Both types of units provide equivalent absolute power readings.

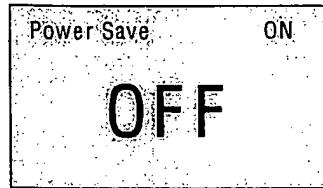
4.1.3 Power Saving ON/OFF

To preserve battery life, the TPM automatically turns off if you do not press any key

for 5 minutes. If you want to select Power Saving Mode, press the  key for over 3 seconds in the Normal mode.



If you want to select the Power Save ON or OFF, press the  key in this Mode.



- Return the Normal Mode

If you want to return the Normal mode, press the key.

Or remain over 5 seconds, automatically returns to the normal mode.

4.1.4 LCD Backlight ON/OFF

- LCD Backlight ON

Press the key to turn on the LCD Backlight.

After about 10 seconds, the LCD Backlight will be automatically turned off.

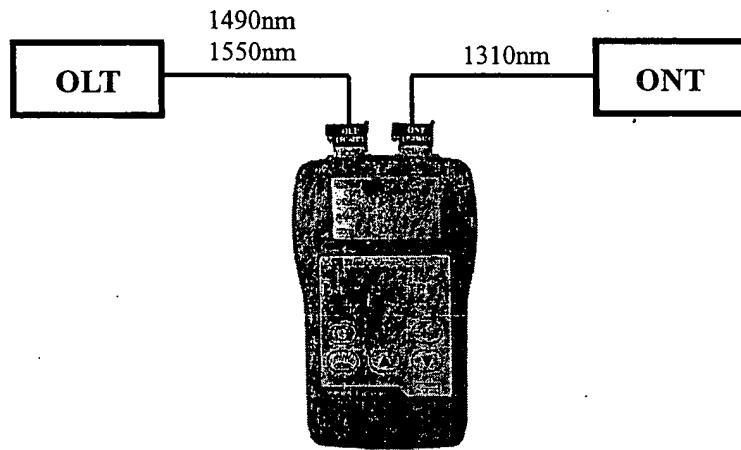
- LCD Backlight OFF

Press the key to turn off the LCD Backlight.

4.2 Triplex Power Meter Operation

For the Triplex Power Meter operation, fibers are to be connected such as below.

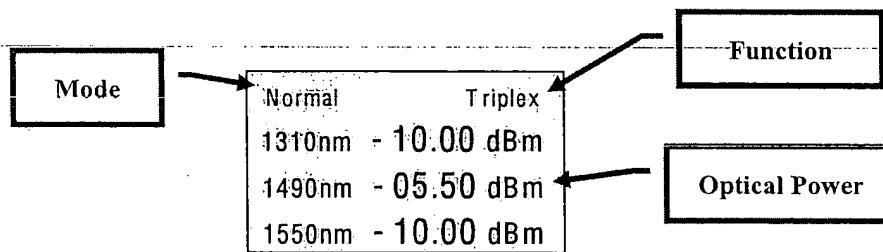
OLT connector of left should be linked to downstream signal(1490, 1550nm), and
ONT connector of right should be linked to upstream signal(1310nm).



4.2.1 Normal Mode

In the Triplex Normal Mode powers of the three PON wavelengths are measured simultaneously while the signals between OLT(1490nm,1550nm) and ONT(1310nm) in PON system are not blocked but passed through the TPM.

Measured values will be shown in LCD.



Optical power unit can be selected mW or dBm using key.

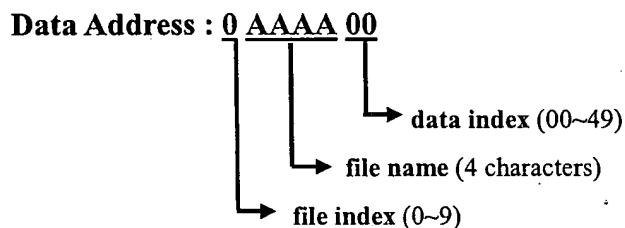


4.2.2 Data Saving Mode

Optical powers measured in the Normal Mode are to be saved in the Data Saving Mode.

Data Address is consisted **file index**, **file name** and **data index** as follows.

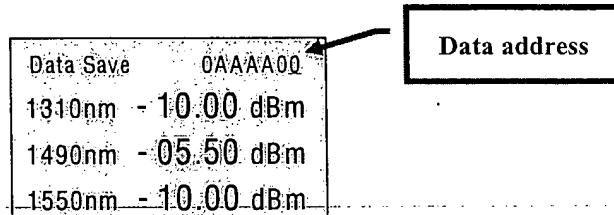
The measured values of three wavelengths (1310, 1490 and 1550nm) are stored to Data Address. There are 50 **data indexes** and 10 **file indexes**. And each **file index** can have 50 different **data indexes**, so that 500 sets of data can be stored in the TPM. **File index** represents 10 files from 0 to 9. For quick reference of the file index, file name is provided with 4 characters that is from A to Z, and 0~9. **Data index** can support 50 indexes from 00 to 49.



When you want to convert from the Normal Mode to the Data Save Mode, press



key.



The characters of Data address can be set by the key(up) or key(down).

When you press key, a character will changed by alphabetical order as following sequence.

Ex) 0 AAAA 00

0 AAAB 00

0 AAC 00

.....

When you press  key, a character will be changed by reverse alphabetical order as following sequence.

Ex) 0 AAAZ 00

0 AAAY 00

0 AAAX 00

.....

If you want to change the position of cursor, press the  key.

The cursor will be moved between file index and data index as below.

Ex) 0 AAAA 00

0 AAAA 00

0 AAAA 00

0 AAAA 00

When you want to change the file name, press the  key over 3 seconds.

Ex) 0 AAAA 00

When you change the file index or data index again, press the  key over 3 seconds.

If you press the  key in this mode, present value is stored.

Then, data index is increased automatically as follows.

Ex) 0 AAAA 00

- data save -

0 AAAA 01

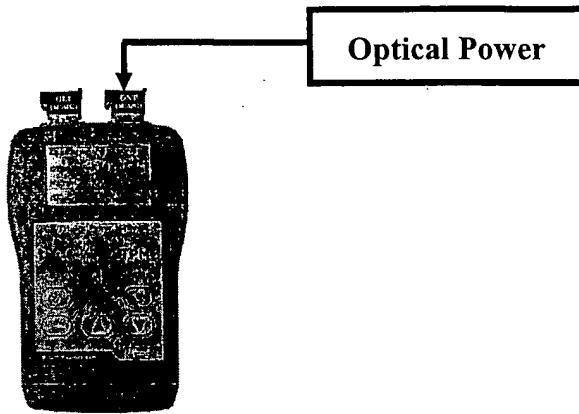
- data save -

0 AAAA 02

If you want return to Normal Mode, press the  key over 3 seconds.

4.3 Single Power Meter Operation

The TPM acts like general optical power meter when the TPM is set the Single Normal Mode and use the ONT port in TPM as below.



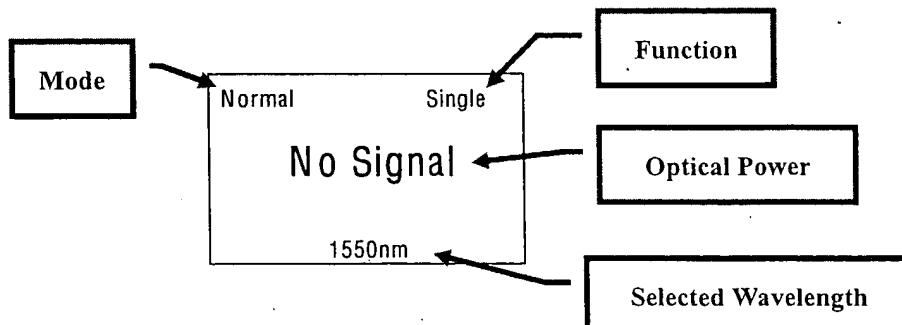
When you press the key more than 3 seconds in the Triplex Normal Mode, the TPM is converted to Single Normal Mode. In this case, if you press the key more than 3 seconds, TPM will be returned to the Triplex Normal Mode. For the Single Power Meter Operation, the ONT port is used for power measurement.

4.3.1 Normal Mode

When the TPM detects no signal, it displays the 'No Signal'.

Measured optical power is displayed in LCD, and Optical power units (mW or dBm)

will be set by key.

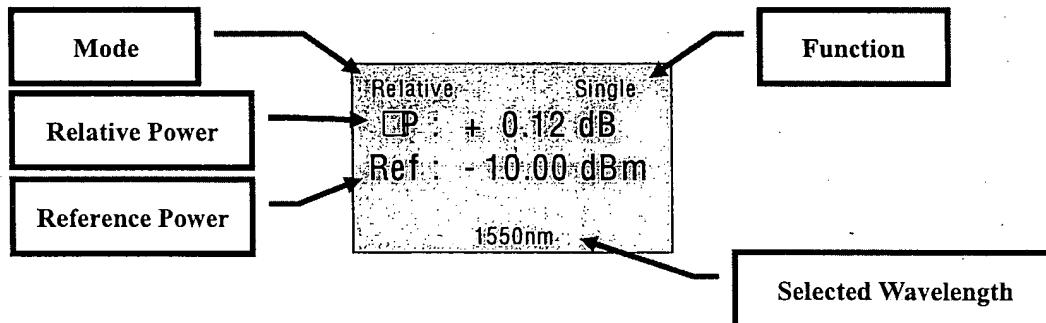


4.3.2 Relative Mode

'Relative Mode' is mode that measures the variation of present power in reference power.

$$\text{Relative Power} = \text{Current Optical Power} - \text{Reference Optical Power}$$

If you press the  key, the mode converts into "Relative mode" and TPM sets up current input power as a reference power.



If you press  key, it will change displayed value as following sequence.

$\Delta P \Rightarrow P_{\min} \Rightarrow P_{\max} \Rightarrow \Delta P$

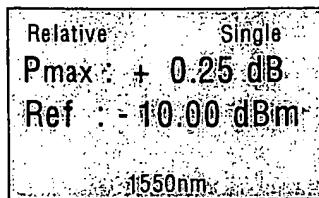
The ΔP is variation of the input power relative to the reference power level.

P_{\min} is the lowest value of ΔP .

Relative	Single
Pmin : - 0.25 dB	
Ref : - 10.00 dBm	
1550nm	



Pmax is the highest value of ΔP .



- Return the Normal Mode

If you want to return the Normal mode, press the key.

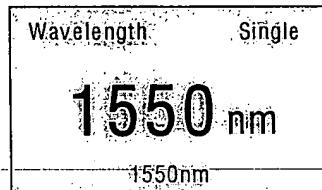
4.3.3 Selecting Calibrated Wavelength

A user must select a wavelength to be measured before the actual measurement.

For the Photodiode built in the TPM, calibrated wavelengths are 1310nm, 1490nm 1550nm, and 1620nm. When you want to select one from the calibrated

wavelengths, press the key in the normal mode.

Then, the following screen appears at a display window



Press the key, a different wavelength can be set by the following order (1550nm \Rightarrow 1620nm \Rightarrow 1310nm \Rightarrow 1490nm \Rightarrow 1550nm).

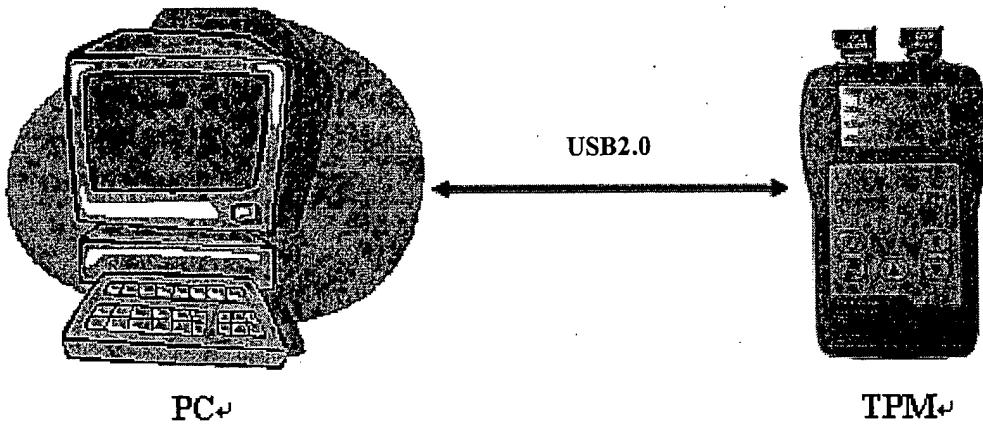
- Return the Normal Mode

If you want to return the Normal mode after setting a desired wavelength, press the



key. Or with any key pressed for 5 seconds, you can automatically return to the Normal mode.

5. Graphic User Interface (GUI)



PC and TPM interfaced with USB2.0. Thus, before you install GUI program, user must install CP210x USB Driver in the PC such as Chapter5.1.

■ System requirements

This GUI program operates in a user friendly Windows® environment and makes use of graphic window displays those are easy to use, simple, and obvious. All the monitoring and control operations are very easy to understand and simple.

Before installing the GUI of "Triplex Power Meter", check the system requirements described below are satisfied:

- PC with Pentium Processor or higher
- Microsoft Windows® 98SE or /2000/XP

The GUI of "Triplex Power Meter" is not tested under Macintosh®, Linux®, or any other operating systems.



5.1 Installing CP210x USB Driver

Before use GUI, you follow the steps below to uninstall previous driver versions of CP210x and to install the new drivers included in this package.

STEP1 : Do not connect the TPM. And insert the given CD to PC.

STEP2 : Remove old drivers that have previously been installed.

For Windows systems, open the Add or Remove Programs window from the Control Panel. Next, select each CP210x entry and click on Remove.

STEP3 : Run the driver executable, CP210x_Drivers.exe, to extract all of the device drivers included with this release. The default installation directory for this release is "C:\Silabs\Mcu\CP210x".

STEP4 : Connect the TPM series.

STEP5 : Install the new drivers. For Windows systems, the Add New Hardware Wizard should open when a new device is detected. Use the wizard to install the drivers by directing it to the "C:\SiLabs\MCU\CP210x\WIN" directory created in step 3.

STEP6 : If you click 'finish' button , setup finishes.

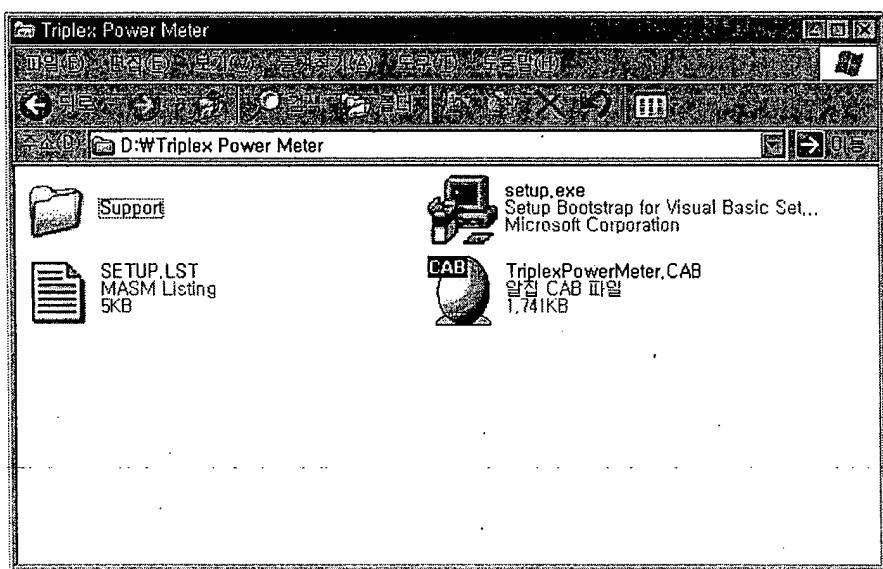


5.2 Installing GUI

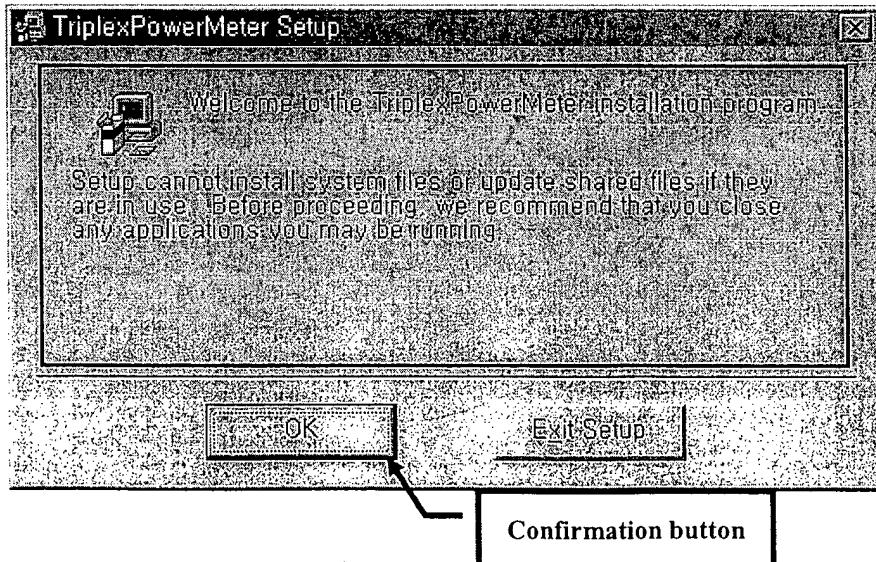
It is strongly recommended that you exit all Windows programs before running the setup program, as the installation may cause any malfunctions on execution of programs left running. "Triplex Power Meter" can be installed on Windows® 98 /Me/2000/XP or Windows NT. The installation steps are described below.

STEP1 : Insert GUI setup CD to PC.

STEP2 : Double click 'Setup.exe' file of 'Triplex Power Meter' folder, then setup will begin.



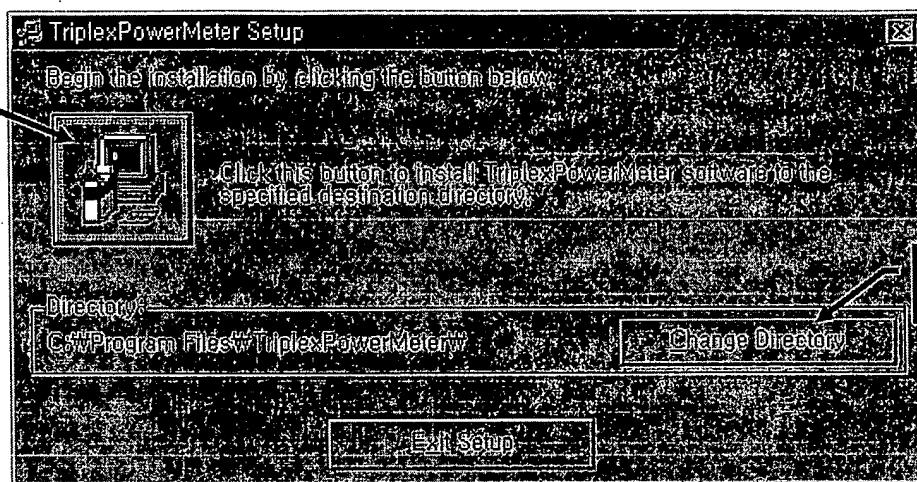
STEP3 : Click OK after confirming that no other application programs are running.



STEP4 : 'C :\ Pogram Files\TriplexPowerMeter' will be established as to primary directory.

You can change installed directory by clicking 'change directory' button.

If you click the setup icon, setup will start.



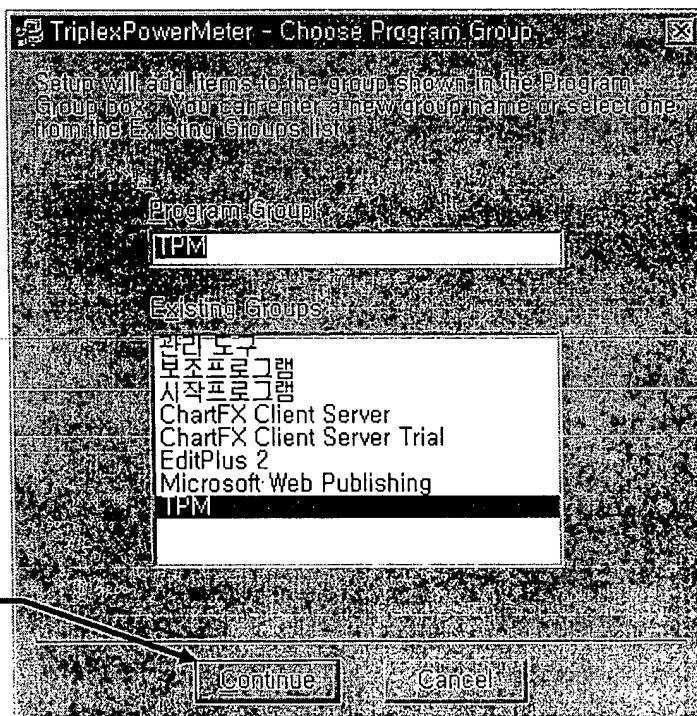
Setup icon

Change directory

STEP5 : Select program file on below display.

Default setting is as 'TPM'.

Click 'Continue' button to proceed further.



Continue button

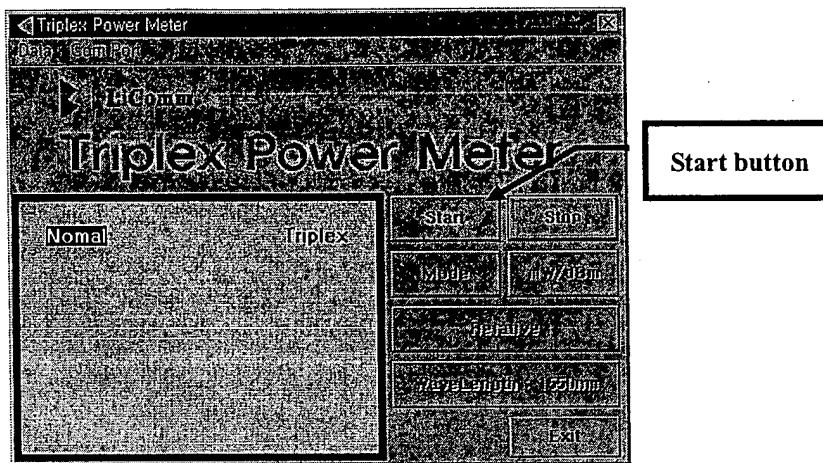
STEP6 : If you click 'confirmation' button, setup finishes.



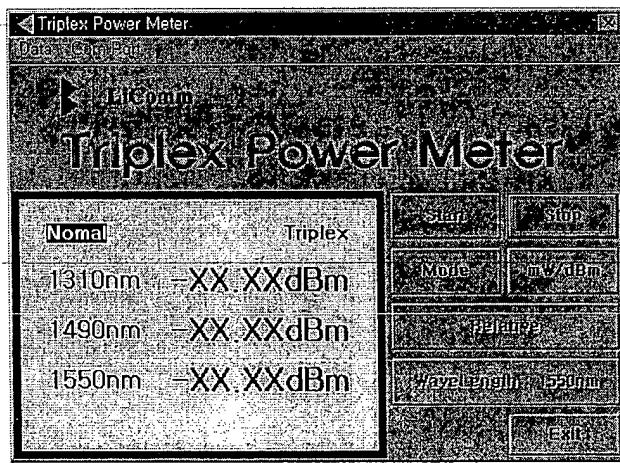
5.3 Operating GUI

Before running the TPM GUI program, connect PC and TPM with USB cable.

If the program is opened a window such as below will appear on screen.



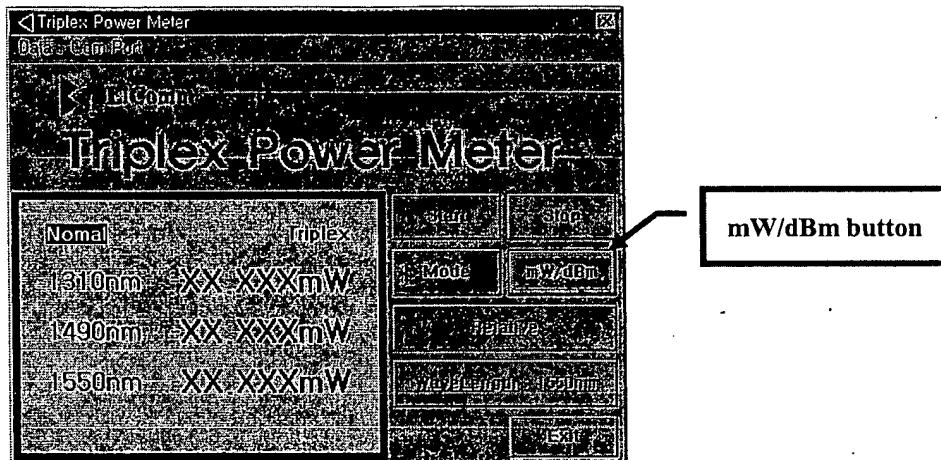
Turn on the TPM and click 'Start' button.



The TPM's default unit is dBm.

If you click 'mW/dBm' button, is converted to mW unit.

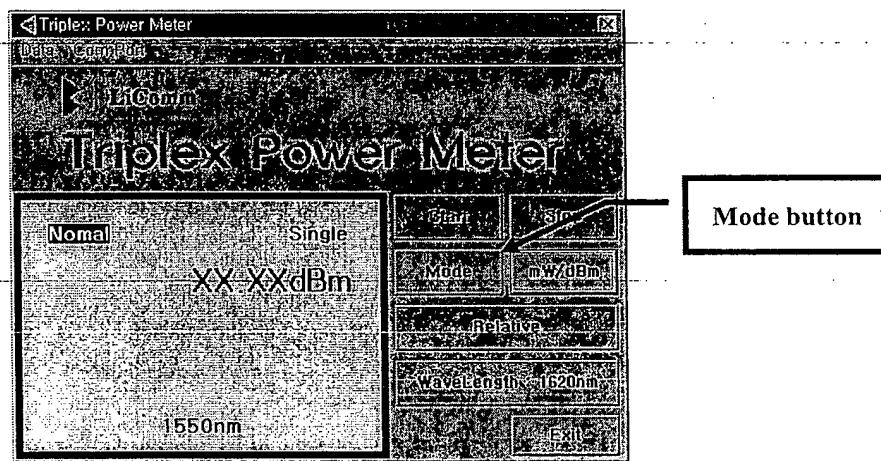
One more click of 'mW/dBm' button, returns the unit to dBm.



The TPM's default is Triplex function.

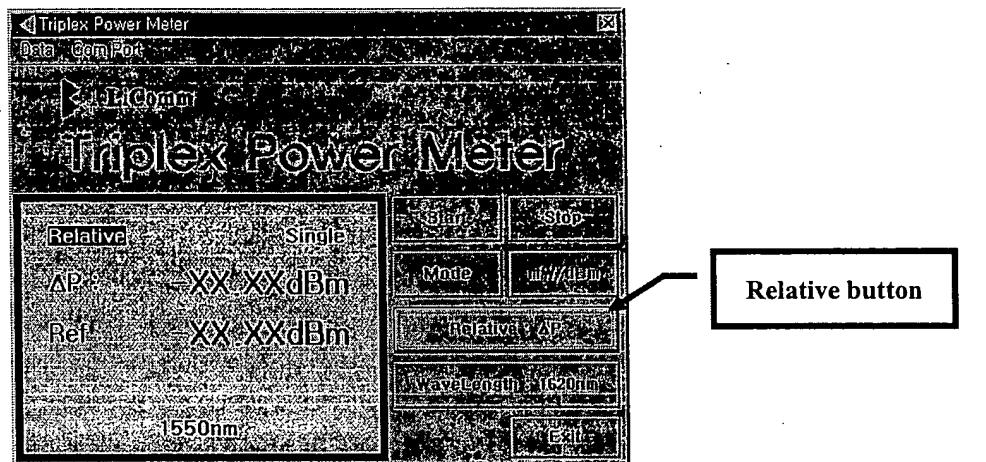
If you click 'Mode' button, is converted to the Single function.

One more click of 'Mode' button returned the mode to the Triplex function.



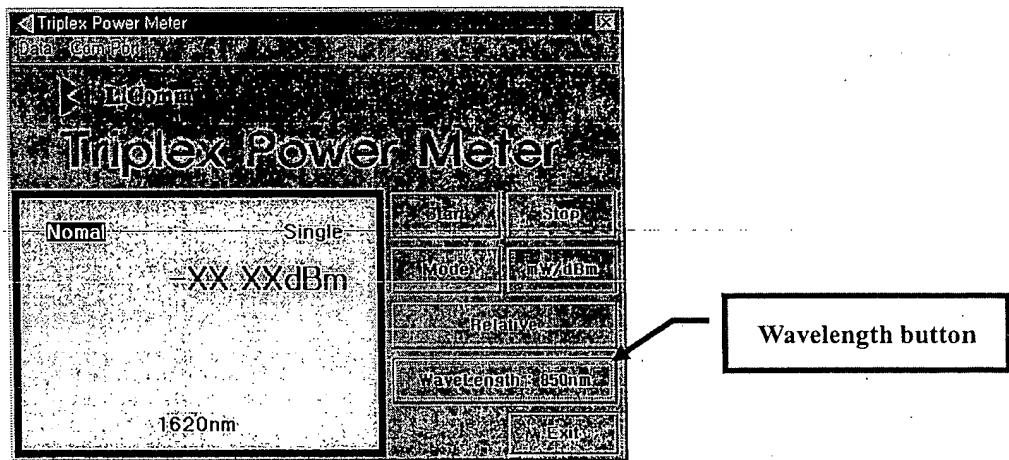
If you click 'Relative' button successively at the Single Normal mode, relative power variation will appear in the window with the order shown below.

$$\Delta P \Rightarrow P_{\min} \Rightarrow P_{\max} \Rightarrow \Delta P$$

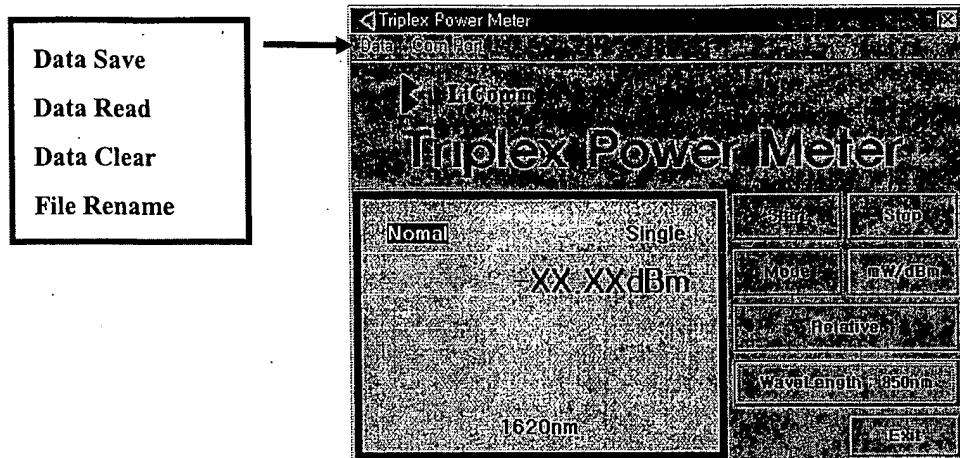


If you click 'WaveLength' button in Single Normal or Relative mode, the calibrated wavelength will appear in the order shown below.

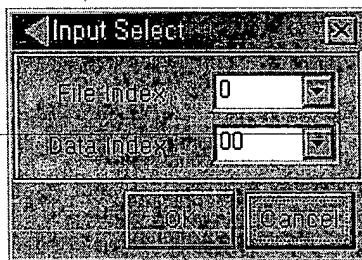
(1550nm \Rightarrow 1620nm \Rightarrow 1310m \Rightarrow 1490nm \Rightarrow 1550nm)



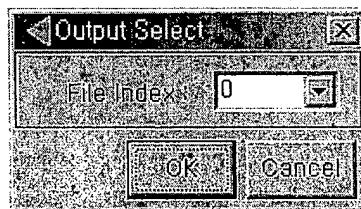
Drop down menu shown below will appear when 'Data' in the menu bar is clicked.



To store measured data, select 'Data Save'. Then, 'Input Select' window will appear. Choose file index and data index where the data will be stored, and click 'OK' button.



If 'Data Read' in the drop down menu from the 'Data' is selected then, 'Output Select' window will appear. Choose file index to search, and click 'OK' button.



'Measurement Data Report' page will appear on the screen as below.

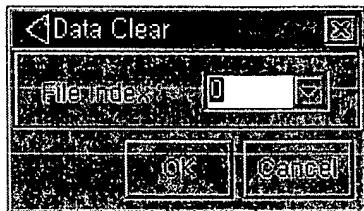
Maximum power, minimum power, variation and average power are displayed in each wavelength in 'Measurement Data Report' window.

Measurement Data Report									
Office		Test Date	2005-04-12						
Building		User Name	AAAA						
Floor		Tested By							
Data Index	Optical Power (dBm)	1310nm	1490nm	1550nm	Data Index	Optical Power (dBm)	1310nm	1490nm	1550nm
1	2.34	-54.85	-53.1		125				
2					126				
3	2.34	-54.85	-53.64		127				
4	2.34	-54.85	-53.58		128				
5					129				
6					130				
7					131				
8					132				
9	2.35	-54.85	-53.03		133				
10	2.37	-54.84	-53.65		134				
11					135				
12					136				
13					137				
14					138				
15					139				
16					140				
17					141				
18					142				
19					143				
20					144				
21					145				
22					146				
23					147				
24					148	2.35	-54.85	-52.44	
					149	2.34	-54.85	-52.99	
	Maximum	Minimum	Variation	Average					
1310nm	2.37	2.34	0.03	2.35					
1490nm	-54.84	-54.85	0.01	-54.85					
1550nm	-52.44	-53.65	1.21	-53.20					



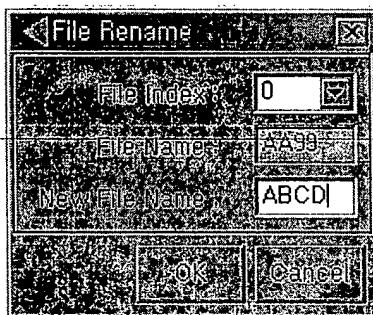
To delete stored data, select 'Data Clear' in the drop down menu. Then, 'Data Clear' window will appear.

Choose file index to be deleted and click 'OK' button.



To change the name of a file, select 'File Rename' in the drop down menu. Then, 'File Rename' window will appear.

After choose the file index and put the new file name in the 'New File Name' and click 'OK' button.



6. Maintenance

6.1 Maintenance Cautions

Severe shock and vibration, and drastic change in operating temperature might hurt accuracy of the measurement. For best results, use the TPM in stabilized condition.

Avoid static electricity, shock, and vibration for longer lifetime of TPM.

A user must always keep clean optical connectors and the face of connectors. A characteristic of TPM and the optical connector cut end can be damaged if operates TPM in dirt or state with a foreign substance on the connector face. Extra care should be taken to keep the connectors and their end-faces clean and free of foreign particle or dust. Any foreign substances in connectors or their end-faces would not only damage the connectors but also degrade the accuracy of the TPM measurement.

Do not use the TPM for over +20dBm optical power measurement.

Always keep clean the end-faces of the optical connectors.

Do not use together with OLT connector and ONT connector in 'Triplex function'.

Use only ONT connector in 'Single function'.

6.2 Repair Procedure

It is prohibited that users tries to repair the TPM on his/her own.

Any malfunctioning or physically damaged TPMs should be kept in room temperature and contact local distributors or LiComm Co., Ltd. for repair (Visit www.licomm.com for contact information).

Only LiComm can perform proper repair service for TPMs since they are very sophisticated devices.

LiComm is not responsible for outcomes of users or any other third party repair attempt.



6.3 Electrical Power Sources

The TPM can be powered in three different method. The available power sources are:

6.3.1 AC adapter/charger

When connected to the adapter/charger, AC current powers the TPM and the TPM charges the NiMH batteries.

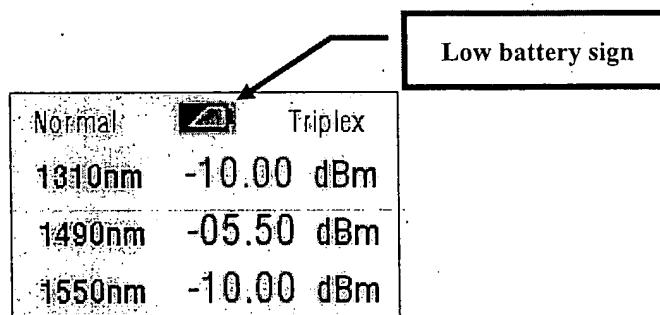
If you disconnect the adapter/charger, the NiMH batteries automatically take over without affecting unit operation.

6.3.2 Rechargeable NiMH battery

When the AC adapter/charger is not connected, the three NiMH batteries Powers the TPM.

When about 10% of the power remains, the indicator starts to low battery sign will show up. Then NiMH batteries need to be charged.

※ When the NiMH batteries run out of power, the TPM will be shut off.



6.3.3 Disposable battery

TPM may be powered by three AAA disposable batteries.



7. Warranty

All LiComm products have been inspected according to our quality assurance standards. However, if any defect or trouble occurring during transportation is found, contact us at our Customer Service Department.

LiComm will replace, at no charge, the defective product(s) that occur within one year of the original date of product delivery. However, the defects due to an operation error, modifications or damages caused by the natural disasters are serviced with charge.

For additional information, contact your local LiComm sales manager or one of the following:

INTERNET : <http://www.licomm.com>

E-Mail : sales@licomm.com

Telephone Number : +82-31-206-6823

Fax Number : +82-31-206-6827

Address : Cheongmyung Towntel 3rd Fl., 1021-4 Youngtong-Dong, Suwon-Si, Kyunggi-Do, 442-813, Republic of Korea.

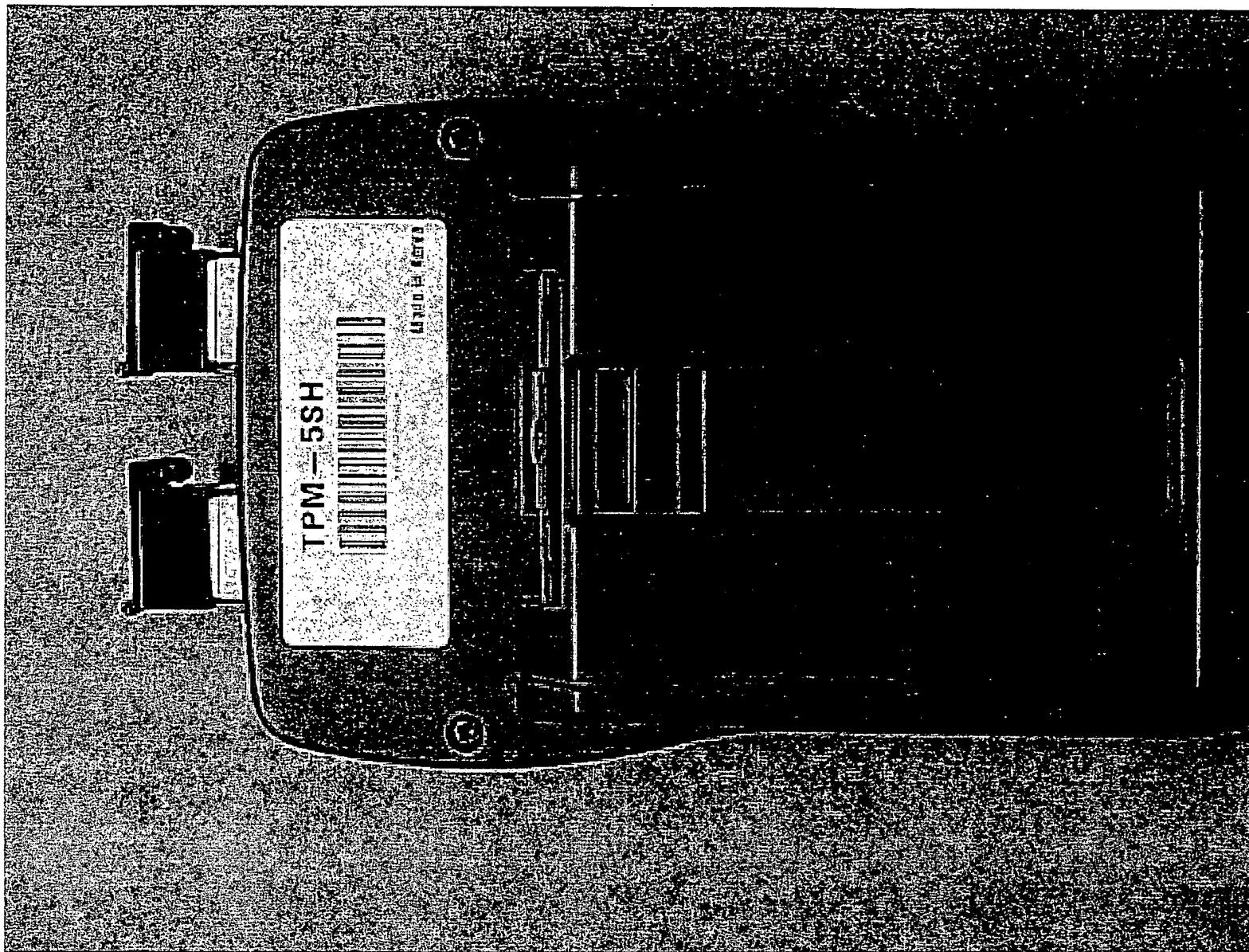
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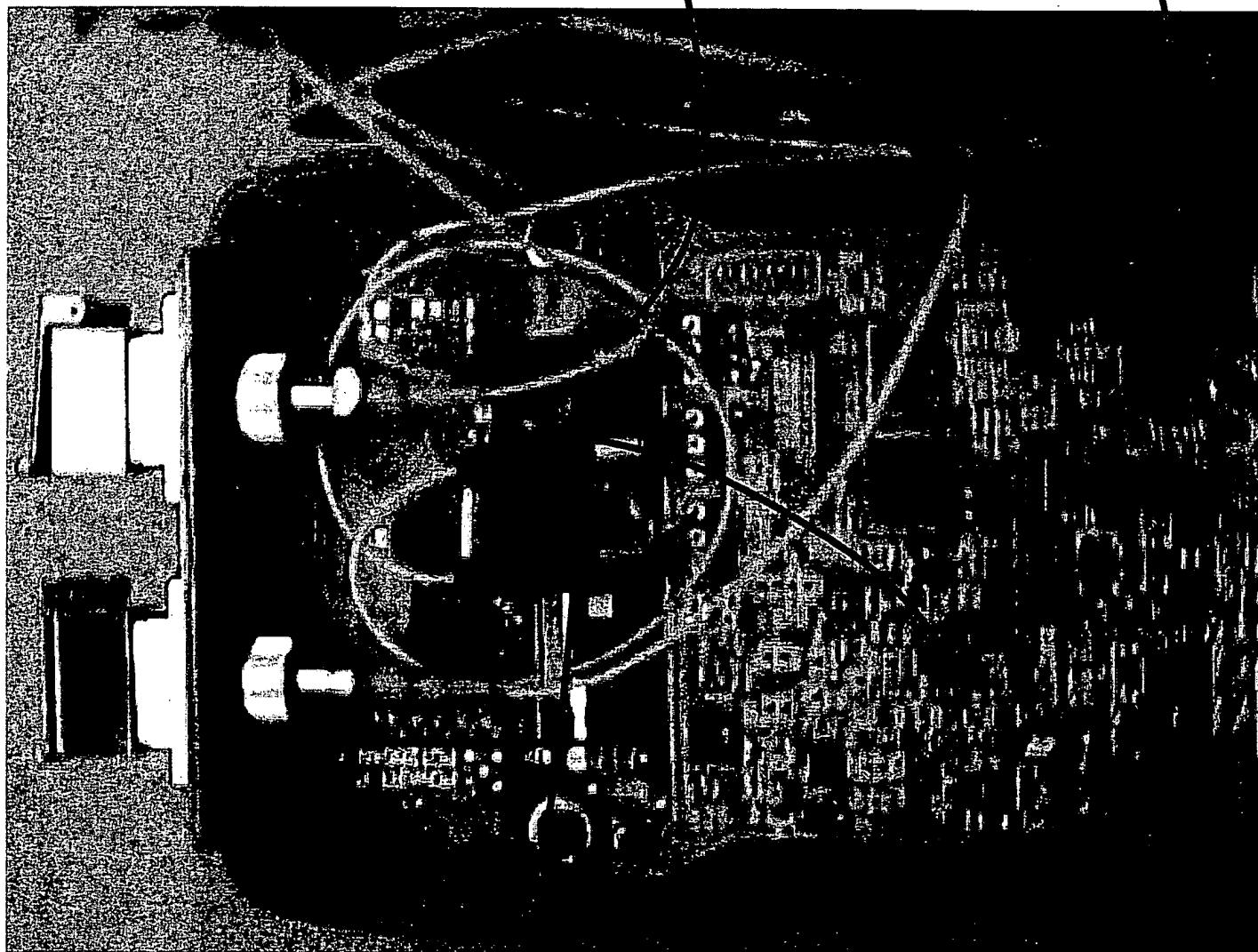
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APPENDIX II



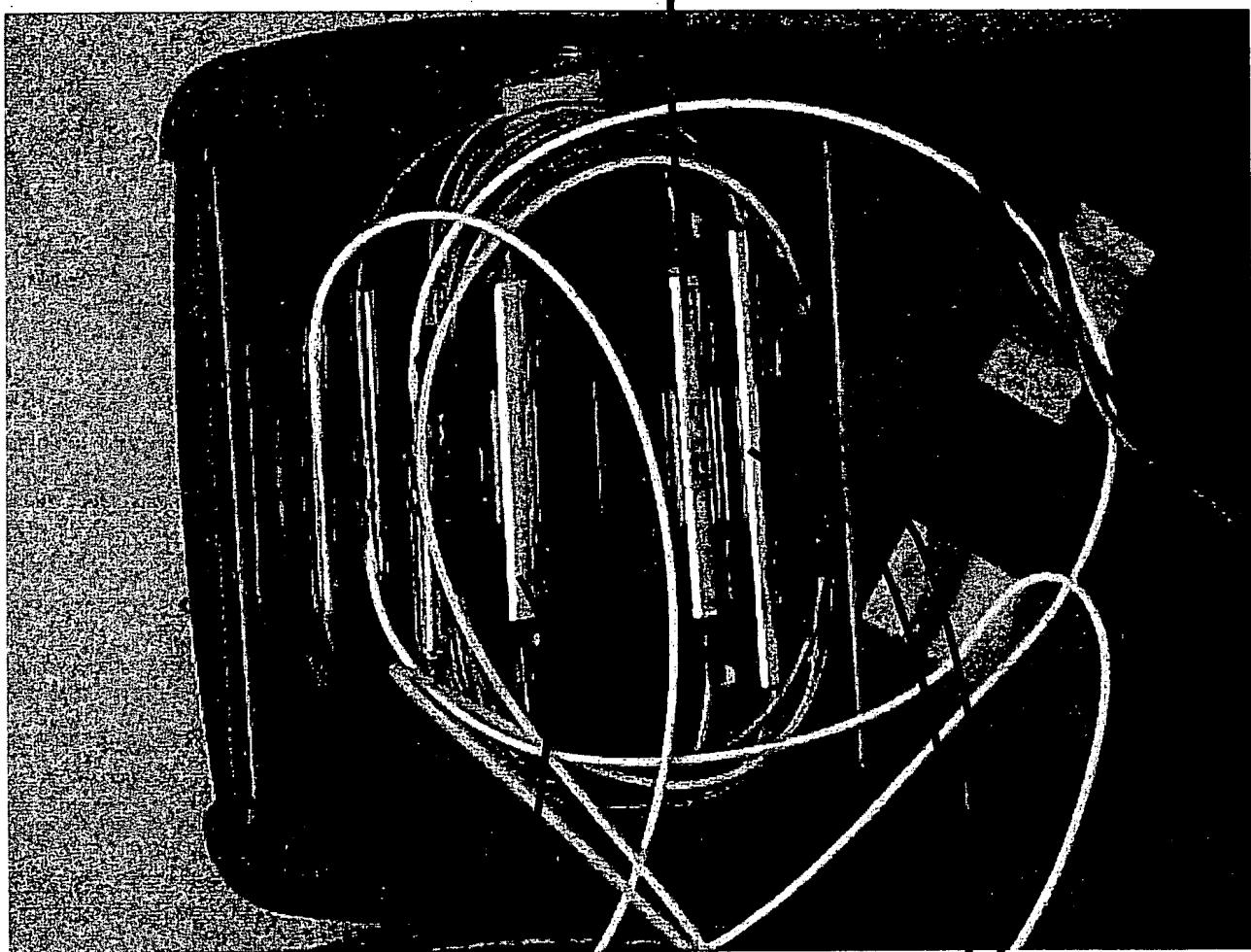


DET 1310 nm
(38, Fig 3)

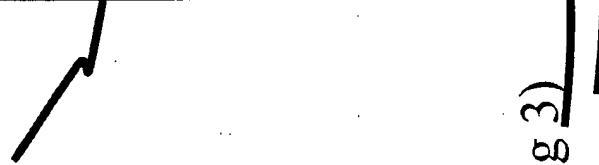
DET 1490 nm
(42, Fig 3)

DET 1550 nm
(44, Fig 3)

Processing
Electronics
(58, Fig 2)

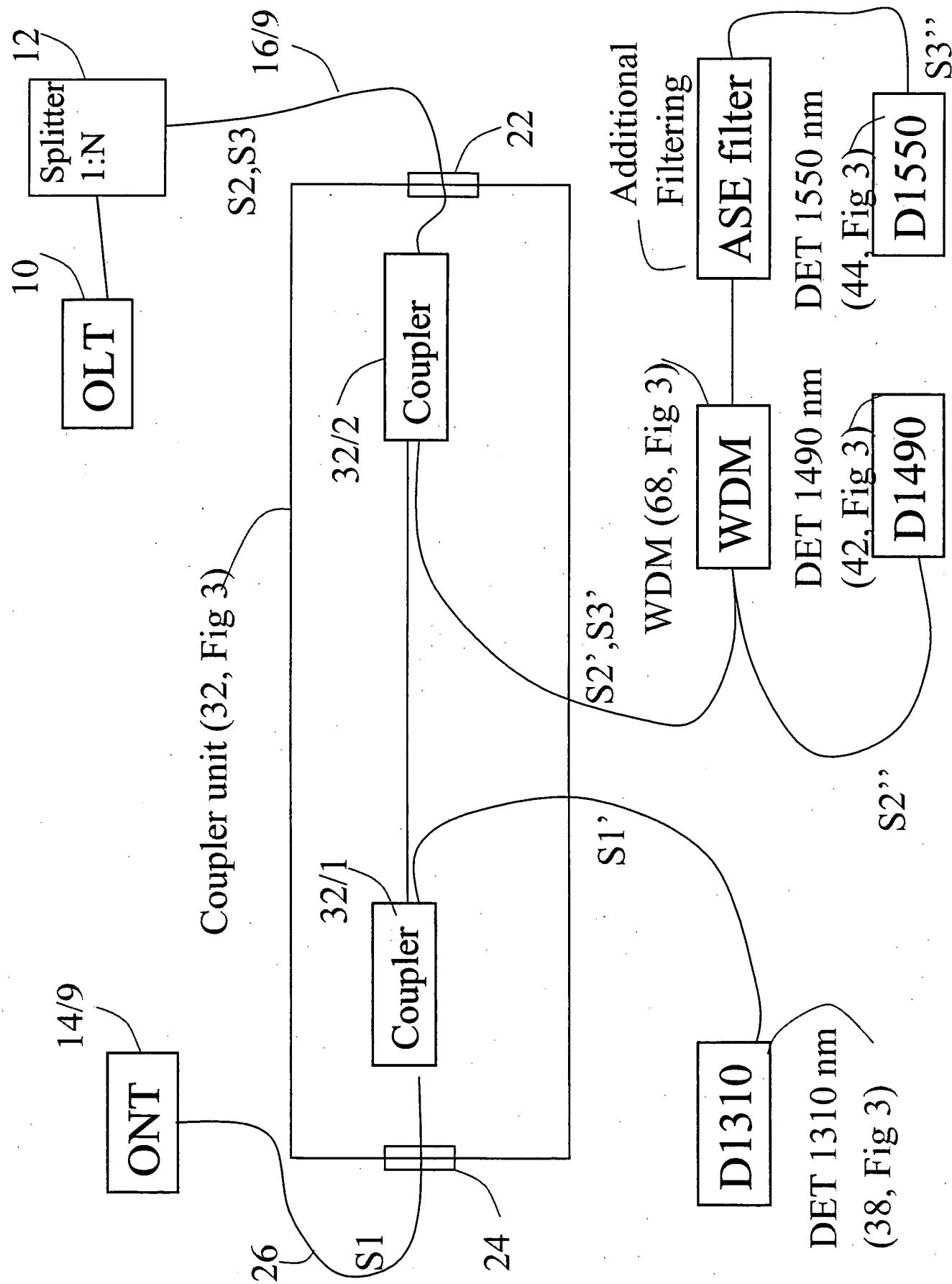


WDM (68, Fig 3)



Coupler (32, Fig 3)
(2 on top of one
another)

Additional
Filtering



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